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Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

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In the Matter of )

Allocation of Spectrum Below )  
5 GHz Transferred from )  
Federal Government Use )


FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY


ET Docket No. 94-32

**COMMENTS OF MOTOROLA, INC.**

Motorola, Inc. (hereinafter Motorola) submits the following comments in response to the FCC's Notice of Inquiry concerning the reallocation of 50 MHz of Federal Government radio spectrum for non-Federal use.

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## **I. INTRODUCTION AND SUMMARY**

In this proceeding, the FCC is soliciting public input on the potential applications for 50 MHz of spectrum slated for reallocation from Federal Government use to the private sector. This reallocation has been mandated by Congress in Title VI of the Omnibus Budget Reconciliation Act of 1993 ("Budget Act") which compels the NTIA to review Federal Government spectrum usage so that it may recommend the reallocation of at least 200 MHz of Federal spectrum below 5 GHz to non-government users.<sup>1</sup> The FCC's Notice of Inquiry ("Inquiry") focuses only on the three frequency bands totaling 50 MHz that the NTIA would reallocate immediately to the private sector.

As the world's preeminent manufacturer of wireless communications devices, Motorola is pleased to participate in this proceeding and offers its expertise to assist the FCC and the NTIA to achieve the goals identified by Congress. While Motorola is well aware of the critical importance of Federal Government operations, it wholeheartedly supports reallocation of useable spectrum. The increased availability of spectrum should allow manufacturers to provide a whole host of new services and products critically important to this nation's public works and industrial infrastructures and more than offset any negative impact that Federal Agencies may incur.

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<sup>1</sup> Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, § 6001, 107 Stat. 312, 379-401 (1993), *to be codified at* 47 U.S.C. §§ 111-117.

While Motorola is highly supportive of additional allocations, it is concerned that the specific frequency bands identified by the NTIA may not be useful in satisfying the most critical unmet needs for spectrum. Specifically, Motorola believes that spectrum is required for wide area private land mobile systems to support the need for advanced radio and imaging technologies by public safety, utilities, and large industrial users. Motorola urges the FCC, with the assistance of the NTIA, to build upon its successful allocation for carrier-based advanced personal communications services ("PCS") with an equal effort devoted to the needs of advanced private networks. In so doing, the FCC would be attentive to the directive of Congress to ensure that the spectrum needs of the public safety community are adequately addressed.

In addition, as recognized by the Commission in modifying its bandplan for terrestrial PCS, additional spectrum should be identified for future mobile satellite service ("MSS") growth. Furthermore, the industry is embarking on implementation of the Intelligent Vehicle Highway System ("IVHS"), which will require spectrum for both wide area and local area communications.

Unfortunately, a preliminary review of the three bands at issue in this proceeding indicate that the first 50 MHz identified by the NTIA for transfer may hold little promise in satisfying anything other than localized area communications systems providing communications service over short ranges. Motorola notes that such operations are already generally allowed by the existing Part 15 Rules in some of the spectrum slated to be reallocated.

Therefore, Motorola is concerned that the spectrum identified by the NTIA for immediate transfer will offer only limited opportunities for the development of new technologies and radio-based industries. Motorola urges the NTIA and the FCC to identify alternative options which can address this deficiency in a timely fashion so that the goals of Congress can be realized and the American public can begin receiving substantial benefits from the reallocation action.

## **II. THE SPECTRUM SLATED FOR IMMEDIATE REALLOCATION BY THE NTIA IS UNLIKELY TO SATISFY THE CRITICAL NEEDS FOR SPECTRUM THAT REMAIN AFTER THE RECENT PCS ALLOCATION**

Just this month, the FCC finalized its spectrum recommendations in the landmark PCS proceeding.<sup>2</sup> The allocation of 140 MHz of spectrum below 2 GHz for advanced, carrier-based communications operations and unlicensed devices will no doubt foster vigorous competition in the delivery of voice and data services and will begin to help satisfy the demand for tetherless access to the national information infrastructure. The PCS allocation will not, however, satisfy all needs for advanced wireless communications services. Rather, the PCS allocation should be viewed as a beginning and it should be recognized that additional allocations will be needed to satisfy a whole host of terrestrial and satellite radio applications.<sup>3</sup>

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<sup>2</sup> *In the Matter of Amendment of the Commission's Rules to Establish New Personal Communications Services*, Gen Docket No. 90-314, *Memorandum Opinion and Order*, released June 13, 1994.

<sup>3</sup> In its 1992 comments to the NTIA's inquiry into the current and future requirements for the use of radio frequencies in the United States (NTIA Docket No. 920532-2132), Motorola reported that over 300 MHz of spectrum was needed to accommodate a broad array of wireless services and technologies. Motorola notes that the NTIA recently provided its own forecast and determined that at least 104 MHz of  
(continued...)

Below, Motorola identifies what it considers the most pressing needs for additional spectrum. Motorola believes that it is incumbent upon the FCC and the NTIA to identify spectrum homes for these applications so that the wireless revolution can continue unimpeded.

#### **A. Private Wide Area Systems**

In its Inquiry, the Commission noted that the Budget Act reaffirmed the FCC's responsibility to consider the spectrum and interoperability needs of the public safety community when making spectrum allocation decisions.<sup>4</sup> Likewise, the FCC noted the recent filing of a petition for rulemaking seeking an allocation of 75 MHz below 3 GHz for the development of an "Advanced Private Land Mobile Communications Service" to accommodate the needs of private land mobile radio users for advanced wireless imaging and decision processing/remote file access systems.<sup>5</sup>

Motorola views the needs articulated by the COPE Petition as one of the highest priorities potentially to be met by the reallocated government spectrum. In its response to the NTIA's Preliminary Spectrum Reallocation Report, Motorola confirmed that it "strongly supports the goals of the COPE Petition and urges the NTIA to fully cooperate with the FCC in locating an appropriate spectrum home for this critical

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<sup>3</sup>(...continued)

spectrum in addition to the 220 MHz of "Emerging Technologies" spectrum will be needed to satisfy mobile requirements. NTIA TM 94-160, National Land Mobile Spectrum Requirement, January, 1994. Further, it is not clear that the NTIA included mobile satellite requirements in this estimate.

<sup>4</sup> NOI at ¶ 9(f).

<sup>5</sup> Petition for Rule Making, filed December 3, 1993, by the Coalition of Private Users of Emerging Multimedia Technologies ("COPE Petition").

need."<sup>6</sup> Motorola believes that while many public safety entities, utilities and businesses might avail themselves to the advanced features of PCS for cost-effective delivery of routine, non-emergency communications, these users will routinely require instantaneous access to wide blocks of spectrum for critical emergency imaging and data services not likely to be provided by carrier operated PCS systems. In any event, all critical public safety communications and many industrial and business applications require the user to be in complete control of the radio channel. Motorola therefore encourages a revitalized effort by the NTIA and the FCC to bring the advances in digital signal processing, imaging, and compression technologies to private communication systems. Companion allocations supporting Federal, state, and local public safety systems could also assist in coordination across multiple agencies and in making cost-effective new technology available to all levels of government. This could be a "win-win" solution for the public, increasingly worried about crime control, as well as for the agencies deploying state-of-the-art communications systems.

Unfortunately, the spectrum proposed for immediate reallocation by the NTIA is unlikely to satisfy this need in the near term. First and foremost, the present state of the radio art requires that spectrum for wide area mobile applications be below 3 GHz.<sup>7</sup> Although the NTIA has identified 100 MHz of spectrum below 3 GHz as satisfying the qualifications for reallocation, the proposed bands are rather small and generally not suitable for aggregation. As for the 50 MHz of government spectrum

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<sup>6</sup> Comments of Motorola, NTIA Special Publication 94-27, filed May 11, 1994.

<sup>7</sup> This fact renders the 4660-4685 MHz band at issue in this Inquiry as useless for wide area land mobile services.

identified as immediately available, for the following reasons Motorola questions whether any significant public interest benefits will accrue through reallocation.<sup>8</sup>

As noted in Motorola's comments to the NTIA's Preliminary Report, the 2402-2417 MHz is already heavily used for non-government operations, particularly by consumer microwave ovens and other industrial, scientific and medical ("ISM") devices. The Preliminary Report indicates that the existing noise floor of the band is approaching -100 dBm in several major markets and, given the anticipated increase in the deployment of Part 15 devices in this band, is expected to continue rising.<sup>9</sup> This level of interference will necessitate higher powered devices to overcome the ambient noise. The net result is higher costs and size of equipment and poorer quality communications services.

The 2390-2400 MHz band suffers similarly due to its close proximity to the 2450 MHz ISM band. Figures E-3 and E-4 of the Preliminary Report show that the noise level measured in this band is within 3 dB of that found within the 2402-2417 MHz band. Thus, devices operating in this band could also suffer a cost and size penalty with respect to other competing services.

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<sup>8</sup> Unfortunately, the Preliminary Report identifies exactly 200 MHz of spectrum that the NTIA believes qualifies for reallocation, the minimum amount specified by the legislation. Thus, the public is unable to weigh alternative allocation proposals that are perhaps better suited to satisfying demonstrated public needs.

<sup>9</sup> The FCC has adopted special provisions for the use of the 2400-2500 MHz ISM band by Part 15 devices. Section 15.247 of the FCC Rules specifies that spread spectrum devices may operate with up to 1 watt transmitter output power utilizing a 6 dBi gain antenna. As noted in the FCC's Inquiry, these technical provisions will likely encourage the increased development of such equipment whose ultimate deployment will further push the ambient noise levels upwards. Notice of Inquiry, ET Docket No. 94-32 at n.14.

The FCC and the NTIA need to give more thought to the needs of private land mobile users in order to find a suitable spectrum home for advanced technologies. One band identified by the NTIA, the 1710-1755 MHz band, holds some promise for accommodating wide area communications services since, at 45 MHz wide, it is the largest contiguous block of spectrum below 3 GHz considered by NTIA. According to the Preliminary Report, however, this band could not be released to non-government use until January, 2004. Further, the Budget Act allows for the continued and uninterrupted operation of fixed links assigned to Federal Power Agencies such as the Tennessee Valley Authority and links whose principal traffic involves safety of life communications. Thus, non-government users of the band would need to coordinate and protect these existing microwave facilities indefinitely. Coupled with the 10 year delay in its availability, this shared spectrum use significantly compromises the utility of this band for wide area services. The FCC and the NTIA should review these conditions of use to determine whether more timely accommodation criteria could be adopted.

Also, Motorola believes that the NTIA and the FCC should conduct further reviews to determine whether portions of the 250-400 MHz band could in fact be a candidate for reallocation to accommodate wide area private land mobile systems. As discussed in the Preliminary Report, the 250-400 MHz band offers "very desirable" propagation characteristics that could lead to rapid deployment of land mobile services.<sup>10</sup> Noting its proximity to existing non-government mobile allocations, the

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<sup>10</sup> Preliminary Report at 4-24.



Preliminary Report concludes that reallocating a portion of this band could offer "substantial benefits" to the public.<sup>11</sup> However, notwithstanding these obvious benefits to be derived through the reallocation of this band, the Preliminary Report indicates that the necessary analysis on the proper sharing of this band cannot be addressed within the rigid timetable and sharing constraints imposed by the legislation.<sup>12</sup> Since the reallocation of this band would offer substantial public benefits, the NTIA and the FCC should work beyond the scope of the Budget Act requirements and determine how and when private land mobile users could gain access to a portion of this band.<sup>13</sup>

Motorola also asks that the FCC fully consider the NTIA's tentative decision not to propose reallocation of the entire 1350-1400 MHz. Although 1390-1400 MHz is proposed to be reallocated in 1999, it is unclear to Motorola why the remaining 1350-1390 MHz is not equally appropriate for private use. In the recent analysis on the spectrum requirements for the fixed services, the NTIA indicated a total of only 582 U.S. assignments within the entire 50 MHz band.<sup>14</sup> In predicting that the present "low" usage of this band would remain at a steady one percent growth rate for the foreseeable future, the NTIA failed to fully articulate why this entire 50 MHz of spectrum could not be made available. Motorola believes that reallocation of this 50

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<sup>11</sup> Id. at 4-25.

<sup>12</sup> Id.

<sup>13</sup> Motorola understands that similar reallocation efforts of portions of this band are occurring in Europe and the U.K. Consistency with international allocations allows users and manufacturers to leverage the resultant economies of scale.

<sup>14</sup> A Preliminary Look at Spectrum Requirements for the Fixed Services, ITS Staff Study, U.S. Department of Commerce, May 1993.

MHz of spectrum would likely provide a greater public benefit than many other bands identified in the Preliminary Report.

#### **B. Mobile Satellite Service**

Motorola and other mobile satellite interests have repeatedly stressed the need for additional spectrum to accommodate future demand for mobile satellite services ("MSS"). In its recent decision on Personal Communications Services, the Commission in fact committed to initiate a proceeding in the near future to allocate additional spectrum for mobile satellite services and to work toward having additional spectrum allocated to MSS at the World Radio Conference to be held in 1995. In addition, the Commission's modified PCS bandplan leaves the flexibility to examine several different options for additional MSS spectrum. Motorola set forth some of these options in its recommendations filed prior to the Commission's PCS decision.<sup>15</sup>

One option Motorola identified for further exploration was use of some of the Federal Government spectrum which NTIA will reallocate for private sector use to help accommodate future MSS requirements. The bands which have thus far been identified by NTIA require further study to determine the feasibility of using them for global MSS. This can be done in the context of efforts that are now underway to prepare U.S. positions for WRC-95. For example, the terms of reference for Informal Working Groups 3 and 4 of the WRC-95 Industry Advisory Committee include consideration of proposals related to additional frequency bands that could be allocated

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<sup>15</sup> See Ex Parte Presentation in GEN Docket No. 90-314 submitted by Motorola, Inc. on May 25, 1994.

to MSS between 1 and 3 GHz and to the Fixed Satellite Service for MSS feeder links. Thus, while Motorola reserves judgment at this time with respect to whether any of the 50 MHz identified in the NOI would be suitable for MSS, the Commission should continue to bear in mind the potential for using a portion of this spectrum to accommodate MSS needs.

### **C. Intelligent Vehicle Highway System**

Motorola also supports the use of reallocated government spectrum for Intelligent Vehicle Highway Systems (IVHS). Motorola envisions that IVHS will require spectrum to accomplish both wide area communications as well as limited or short range messages. For example, wide area communications infrastructures will be needed to support route guidance information, emergency vehicle and public transit management, and enroute transit advisories. Short range communications will be used for electronic fee payments at toll booths or parking lots, in-vehicle signing, and commercial vehicle clearances. These communications and messages will be integrated into existing wired infrastructures and, eventually, the national information infrastructure.

The key to the IVHS will be the ability to provide continuous updates of road conditions through the constant monitoring of traffic flow and the efficient management and dissemination of that information. Its success will depend upon sufficient spectrum, particularly spectrum suitable for mobile applications, to accomplish this mission in short time durations. Although the spectrum identified for immediate

reallocation by the NTIA may not be able to satisfy any wide area mobile service, including IVHS applications, it may have some utility for short range IVHS communications although further study is needed.

### **III. PORTIONS OF THE 50 MHz TO BE IMMEDIATELY REALLOCATED ARE ALREADY BEING USED TO SATISFY CERTAIN NON-GOVERNMENT NEEDS**

As previously discussed, the 2400-2500 MHz band is allocated on a primary basis to ISM devices. The FCC has adopted special provisions under Part 15 of its Rules to allow unlicensed spread spectrum devices to utilize the ISM bands. In the 902-928 MHz band, similar provisions have resulted in an explosion of consumer and industrial devices operating under these rules.<sup>16</sup>

Motorola expects that the 2.4 GHz ISM band will serve as one home for the next generation of unlicensed digital devices including consumer cordless telephones, wireless PBX units and wireless LAN units. Such devices, which operate over short distances, should be able to overcome the ambient ISM noise level caused by over 80 million consumer microwave ovens provided that sufficient power levels are afforded. In fact, significant resources have already been applied to the commercial development of this band by unlicensed devices. For example, IEEE 802 (Local and Metropolitan Standards Committee) has been chartered by the IEEE to produce standards for Local, Metropolitan and Integrated Voice/Digital communications networks. This committee

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<sup>16</sup> The NTIA's Preliminary Report estimates that there are over two million non-Federal transmitters operating in the 902-928 MHz band. Preliminary Report at 4-9.

is presently working on its first radio LANs standard for computer devices operating in the 2.4 GHz band.

Motorola supports the continued use of the ISM bands for unlicensed digital devices as good spectrum management. Particularly with respect to the 2.4 GHz band, communications devices must overcome a tremendous threshold to provide high quality, low cost services. Given the high noise floor, it is doubtful that this band would be useful for competitive carrier based communications services or generate any significant revenues through auctions. Likewise, due to its proximity to the ISM band, the 2390-2400 MHz band may also be best suited for limited range communications services.

#### **IV. CONCLUSION**

The 1993 Budget Act offered a great opportunity for the spectrum managers of the United States to review existing operations with an eye toward the future. In Motorola's view, the immediate future will require the allocation of spectrum for advanced private land mobile operations to help support critical public works offices and the industrial infrastructure. Time and time again, private radio has demonstrated its positive role in protecting this nation's citizenry and by creating jobs through increased industrial productivity.

Based on a preliminary review, the work of the NTIA has not uncovered any spectrum that would provide immediate benefits to the traditional land mobile user community. This deficiency must be addressed in joint cooperation between the NTIA,

the FCC and the wireless communications industries. If performed expeditiously, such cooperation will allow us to accomplish the goals of Congress espoused in its legislation. In particular, Motorola urges the NTIA and the FCC to jointly reexamine other options, such as the 250-400 MHz and 1350-1400 MHz bands, as well as less restrictive sharing criteria and faster reallocation of the other 150 MHz proposed in the NTIA's Preliminary Report.

**Motorola, Inc.**

June 15, 1994